Hazardous Substances & Public Health
Volume 6, Number 1 • Winter/Spring 1996

Protecting the Public Health

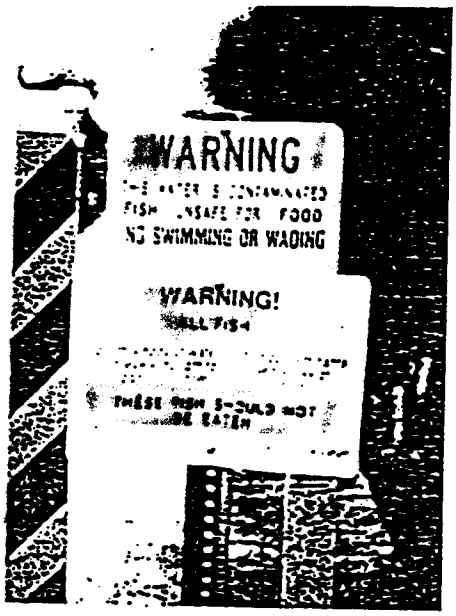
States Issue a Record Number of Health Advisories

Fish Contaminated with Mercury Is a Rising Health Concern

Forty-six states issued public health warnings in 1994 advising citizens to avoid or limit fish consumption because of chemical contamination in thousands of water bodies across the country—a 20% increase from the previous year. Sixty percent of the health warnings against fish consumption are related to mercury contamination of the fish, reports the US Environmental Protection Agency (EPA).

"Forty percent of the nation's rivers, lakes, and streams are not suitable for fishing and swimming because of pollution—this is an alarming health concern," said EPA's administrator Carol Browner. During 1994, large portions of the nation's coastal areas and all of the Great Lakes had fish advisories in effect. Most of the fish advisories applied to noncommercial fishing. Of the 46 states, 7 (Maine, Massachusetts, Michigan, Missouri, New Jersey, New York, and Florida) issued statewide advisories in 1994 against eating fish from state waters because of chemical pollutants such as mercury, PCBs (polychlorinated biphenyls, a now-banned electrical insulator), the pesticide chlordane, dioxins, and the banned pesticide DDT. In 1995 New Hampshire and Vermont issued similar statewide fish advisories.

Fish advisories are recommendations to limit consumption of [illegible] species of fish taken from waters where chemical contaminants are present. Each advisory is different: an advisory may recommend no consumption or limited consumption. Women who are pregnant or who are breastfeeding their infants are at greater risk from eating contaminated fish. Other groups are at risk because they consume large quantities of fish: Native Americans, some segments of the Asian-American community, and [illegible]



Sixty percent of health warnings against fish consumption are related to mercury contamination.

fishing to provide food for their families.

The largest sources of mercury contamination are air emissions fro power plants that burn coal and incinerate wastes containing merc or mercury-containing products an industrial facilities that use mercur in their processes. Once released in the atmosphere, mercury can be deposited in water directly or throu runoff (eliminated waste products from manufacturing processes). On the water, the mercury can be converted by bacteria to a carbon-containing or organic form of mercur called methylmercury. Methylmercu is highly toxic and accumulates in fi flesh. Long-term exposure of humar to organic mercury can permanentl damage the brain, kidneys, and developing fetuses. (Also see related article on the impact of inorganic mercury, "An Old Danger in Need of New Public Education Efforts," page 4).

The general public can call state government agencies (in most cases the state health department) for information about state fish advisories. EPA also offers the "National Listing of Fish Consumption Advisories" to the public free of charge on five computer (PC-based, 3.5-inch) diskettes. The database contains information on each body of water fo which an advisory has been issued, including the type of advisory (such as restricted consumption bans), fish species, contaminating chemicals, population segments affected, issue dates, and state government agency contacts and phone numbers. The database may be used to generate maps for specific geographic locations to help monitor fish contamination.

For copies of the diskettes, request document number 823-C-95-001 from EPA's National Center for Environmental Publications and Information, 11029 Kenwood Road, Cincinnati, Ohio 45242; telephone [illegible]

CONTAMINATION WARNING

Unacceptable levels of mercury found in fish

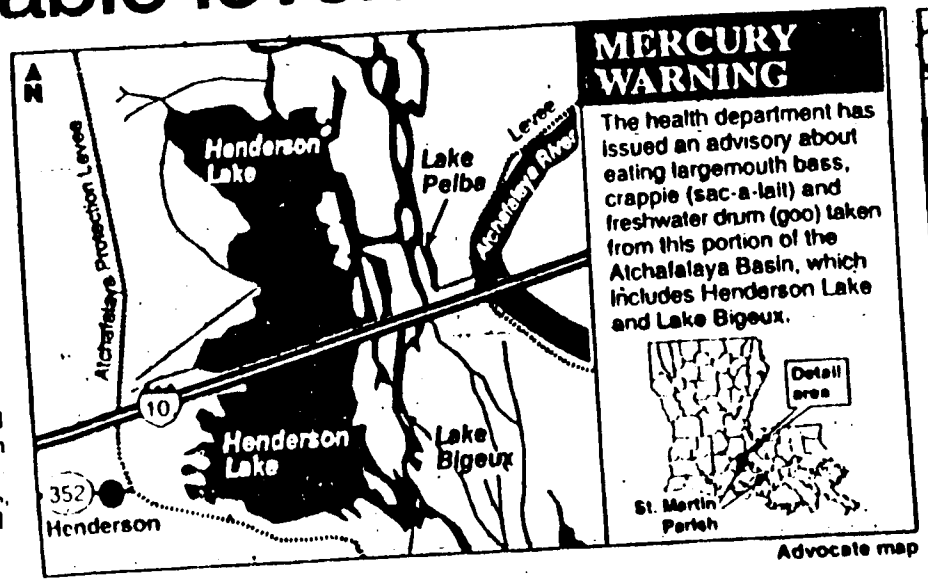
By BOB ANDERSON
Environmental editor

Some species of fish from popular Henderson Lake and adjacent parts of the Atchafalaya Basin contain "unacceptable levels of mercury," the health department said in a warning to consumers.

The high mercury levels are contained in largemouth bass, freshwater drum (goo) and crappie (sac-a-lait), according to the state Department of Health and Hospitals.

Department of Environmental Quality officials said mercury can settle into water bodies from air pollution or come from direct sources, such as spills of mercury in an oil field.

(See FISH, Page 5A



MERCURY WARNING

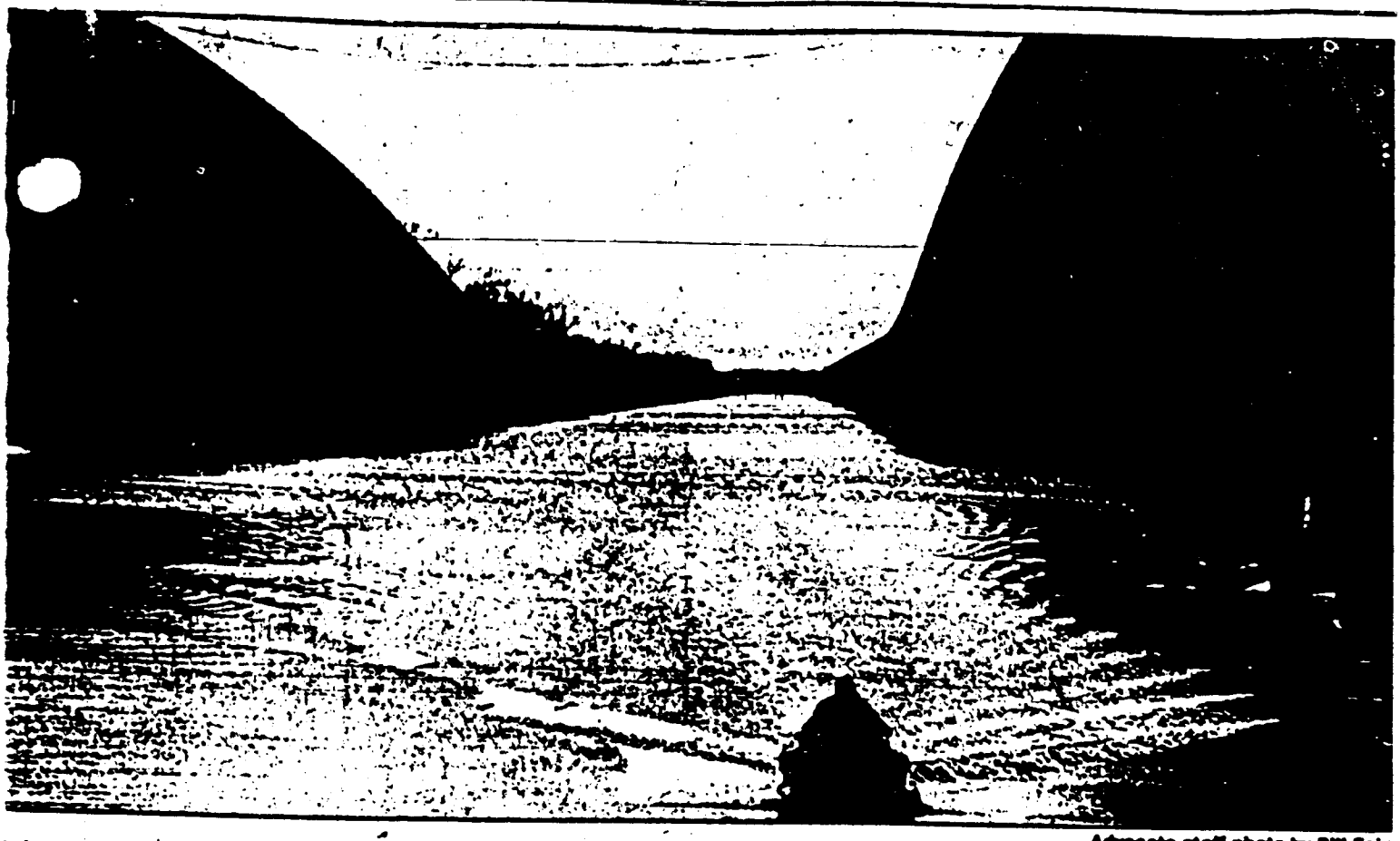
The health department has issued an advisory about eating largemouth bass, crappie (sac-a-lait) and freshwater drum (goo) taken from this portion of the Atchafalaya Basin, which includes Henderson Lake and Lake Bigeux.

Advocate map

Advocate file photo

The Rev. Kevin Stevens, shown fishing in Henderson Lake before the health warning, said after learning of the contamination that he'll probably fish elsewhere.

3-5-96



Advocate staff photo by Bill Feig

Bob and Kathie Pogue approach the boat launch just west of Butte Larose in the Henderson Lake area.

Fish

CONTINUED FROM PAGE 1A

DEQ records show that mercury levels in fish are low in most parts of the Atchafalaya Basin tested.

However, Henderson Lake, which is popular with anglers from Baton Rouge and Lafayette, and some other parts of the basin in St. Martin Parish are notable exceptions, The Advocate showed in stories published in November.

The area of contamination includes Lake Sigeux and all waters within the area bounded on the north by the St. Landry-St. Martin Parish line, on the east by the western bank of the Atchafalaya River, on the south by La. 3177 and on the west by the West Atchafalaya Basin levee, according to DEQ.

Pregnant and breast-feeding women, along with children under the age of 7, shouldn't eat more than one meal (8 ounces) of bass, crappie or drum per month from the contaminated area, the health department advised.

That's not much fish and most people who know about the advisory will probably go elsewhere to fish, said Randy Lanctot, executive director of the Louisiana Wildlife Federation.

"Henderson is a popular place, with easy access," and "on any given weekend it's loaded with people fishing," Lanctot said.

"It is going to hurt the fishing activity [illegible] as it should," said Lanctot. "I just hope the message gets out to people to be careful" about eating fish from there.

Mercury can damage the nervous system and kidneys, according to the health department.

It's most dangerous to a fetus or child whose nervous system is still developing, said Carey Pope, head of the Department of Toxicology at Northeast Louisiana University School of Pharmacy and Health Science.

When a pregnant woman eats mercury-contaminated fish, much of the contamination crosses the placenta to her fetus, where it poses a risk of damaging the developing nervous system, he said It can also be transmitted to babies through breast milk, said Kevin Baer, an aquatic toxicologist with Northeast.

Even in adults, high levels of mercury contamination can cause severe sensory and visual problems, Baer said.

"It destroys neurons in the central nervous system," causing "irreversible effects," he said.

People believing they have symptoms of mercury poisoning should contact their physicians, the health department advised.

The health department said levels of mercury in fish from the contaminated areas haven't been high enough to issue an advisory to adults other than pregnant or breast-feeding women.

Unlike some toxic chemicals, which accumulate in fatty tissue of fish, mercury is usually found throughout the edible portion, so it cannot be removed by special cleaning or cooking techniques, said health department officials.

In general, people can reduce their exposure to mercury by eating smaller fish, since they haven't had a chance to accumulate as much mercury as larger fish, said toxicologist William Hartley of Tulane University School of Public Health and Tropical Medicine.

Records of numerous fish sampled from Henderson showed averages of above .5 parts per million of mercury, with some larger fish exceeding 1 ppm.

State officials use .5 ppm as a benchmark for indicating mercury contamination problems based on their own risk analysis and the standard Florida uses to issue fish contamination advisories.

Atchafalaya Basin testing showed acceptable mercury levels in Grand Lake, Flat Lake, Bayou Sale, Cow Island, Beau Bayou, Bayou Benoit and Big Bayou Pigeon.

There are a lot of oil fields in the Henderson area, but DEQ doesn't have any information on spills or whether the oil industry has used a lot of mercury meters on its pipelines there, DEQ officials said.

The contaminated area doesn't have a lot of connection with the rest of the Atchafalaya Basin, said Dugan Sabins of DEQ's water division. It mainly gets water from rainfall and agricultural runoff, he said.

Henderson Lake doesn't flush as much of the Atchafalaya Basin [illegible] pollutants to build up there, Lanctot said.

"Whatever the cause, it needs to be determined and corrected," he said.

(2)

page 2, 3

Pioneer Minnie Pearl dead at 80

REGIONAL NEWS

Advisory issued about eating fish from Blind River; mercury cited

By JOHN McMILLAN
River parishes bureau

Three state agencies issued an advisory Friday warning the public against eating choupique, also called bowfin, caught in Blind River due to "unacceptable levels of mercury" detected in the fish.

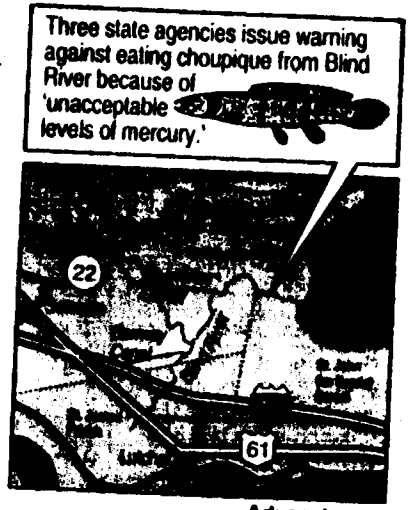
Other fish in Blind River are not considered dangerous to human health.

The warning specified that women who are pregnant, breast-feeding or planning to be pregnant as well as children less than 7 years of age should avoid eating Blind River choupique.

The joint advisory was issued by the Department of Health and Hospitals, the Department of Environmental Quality and the Department of Wildlife and Fisheries.

The advisory includes Blind River in St. James, Ascension, Livingston and St. John the Baptist parishes.

Emelise Cormier, program manager of DEQ's planning and assessment section, said the mercury was discovered through routine sampling activities that DEQ has been conducting since 1994.



Advocate map

"The levels we've found are in the .5 ppm to 1 ppm range," Cormier said. "It's enough for us to be concerned about potential damage to the nervous system in fetuses and children whose nervous systems are still developing.

"There could be subtle effects, such as attention deficit," from eating the fish, she said.

For adults, a person "would have to be eating fish with 1 ppm (mercury content) on a daily basis for months" to have any ill effects, Cormier said.

Those effects, she said, would be numbness of tongue and fingers, slurred speech, coordination problems and vision problems.

Cormier said the worst case of mercury poisoning occurred in Japan in the 1950s after a company dumped mercury into a bay. The fish taken from the bay were found to contain 20 ppm of mercury.

"That's enough to cause people to get brain damage," Cormier said.

She said most researchers believe that mercury found in fish comes from the environment due to natural occurrences such as volcanic eruptions, ocean evaporation and wetlands systems.

Man's activities such as burning fossil fuels and solid waste also contribute to placing mercury in the environment, Cormier said.

Man's body found in Labadieville canal

River parishes bureau

LABADIEVILLE — The body of a man found floating in a canal near here is believed to be that of Nick J. Gagliano, 34, 877 La. 398, Labadieville, whose pickup truck was involved in a one-car crash April 17, an Assumption Parish sheriff's spokesman said Friday.

"There are circumstances surrounding this incident which are very peculiar," spokesman Lonnie Cavalier said. "We will await the results of the autopsy before releasing further details," he added.

The accident, in which Gagliano's truck ran off La. 398 and turned over near the canal, occurred about midnight, Cavalier said.

Gagliano was not at the scene when the Louisiana State Police arrived to investigate.

An intensive search failed to locate Gagliano, Cavalier said, and his body eventually was found by family members Wednesday.

Page 2.4

Exposure Pathways

- Elemental mercury vapor accounts for most occupational and many accidental exposures.
- **The major source of organic methylmercury exposure in the general population is fish consumption.**
- Mercury-containing dental amalgams have not been proven to cause adverse health effects.

Mercury (Hg) is a metal found in the environment in its elemental state and as organic and inorganic compounds. For 3000 years, mercury, in various forms, has been used in medicine and industry. Although most medicinal uses have been discontinued, industrial uses of mercury are increasing.

Mercury exists in three forms: elemental mercury (Hg^0), inorganic mercury salts (Hg^{1+} and Hg^{2+}), and organic mercury. Elemental mercury is a silver-gray liquid at room temperature that vaporizes readily when heated. Commonly referred to as quicksilver or metallic mercury, it is used in thermometers, thermostats, switches, barometers, batteries, and other products. Elemental mercury vapor accounts for most occupational exposures.

The intermediate oxidation state, Hg^{1+}, forms numerous mercurous salts; the best known is mercurous chloride or calomel, which was commonly used in teething powders and other medicines until its adverse effects were publicized in 1948. The highest valence state, Hg^{2+}, forms a variety of mercuric salts, which are used to inhibit bacterial or fungal growth. Most mercurous and mercuric salts readily disassociate into ions in the body.

Under appropriate conditions, Hg^{2+} can covalently bind carbon to form organomercury compounds; the most important in terms of human exposure is methylmercury (MeHg). MeHg is the form most frequently involved in mercury food poisoning. Elemental mercury and MeHg compounds have a greater ability to cross cell membranes than do the mercurous or mercuric salts and are consequently more neurotoxic than mercury salts.

The major source of atmospheric mercury is the global off-gassing of mercury from soils and surface waters. Burning of fossil fuels, particularly coal, contributes to the level of mercury in the atmosphere. The airborne level is increased by disposal of solid waste (e.g., thermometers, electrical switches, and batteries) in landfills; application of mercury-containing paints, fungicides, and pesticides; and combustion of waste oils.

Weathering of mercury-bearing rock and industrial effluents are the major sources of mercury contamination in water. Elevated mercury concentrations have been detected in approximately 25% of the groundwater and surface-water samples from 2783 hazardous waste sites tested by the Environmental Protection Agency (EPA). Groundwater surveys also have detected elevated mercury concentrations in some drinking-water supplies. Industrial processes that may produce mercury-containing effluents include chlorine and caustic soda production, mining and ore processing, metallurgy and

Introduction

Mercury contamination of fish is a widespread problem throughout much of the United States and also in other countries. Levels of mercury in fish sufficient to exceed the US Food and Drug Administration (FDA) action level of 1 part per million (ppm) have been found from many waterbodies, including some in Louisiana. Fish consumption advisories due to mercury contamination have been issued in 29 states, including a stretch of the Ouachita River in Louisiana from the Arkansas border to the lock and dam at Columbia. Besides posing a human health risk, elevated levels of mercury in fish can also have ecologically significant effects, such as affecting reproduction (Beckvar, Field, Hoff, and Salazar 1994). The Louisiana Departments of Health and Hospitals and Environmental Quality (LDHH and LDEQ) coordinate in the assessment of data for health risks and jointly issue advisories if warranted. The two agencies will consider issuing a health advisory limiting fish consumption for pregnant or lactating women and young children for locations where the average concentration of mercury exceeds 0.5 ppm in fish and shellfish. At average concentrations of 1.0 ppm, the agencies will recommend no consumption for pregnant or lactating women and young children and limited consumption for the general population.

Methyl mercury is the form of mercury that is predominantly picked up by fish and stored in muscle tissue. The methylation of inorganic mercury seems to be enhanced by the presence of clear, low pH water. Methylation rates of mercury also tend to be higher in freshwater compared to saltwater, and in low oxygen conditions compared to waters with high dissolved oxygen levels. There are numerous potential sources of mercury to Louisiana waters, including atmospheric deposition, natural geologic deposits, industrial/municipal discharges, and from previously contaminated sediment. Inorganic mercury in waterbodies is primarily bound to the sediment; little mercury is found in the water (Beckvar, Field, Hoff, and Salazar 1994). The presence of mercury in the sediments of a waterbody is not alone sufficient to produce a contamination problem in fish. Water conditions must also be conducive to the methylation of the inorganic mercury for significant accumulations in fish to occur.

Mercury levels tend to increase in higher trophic levels through biomagnification. Small aquatic organisms pick up methyl mercury and transfer this methyl mercury to larger organisms when they are eaten. The level of methyl mercury becomes magnified as progressively larger predators ingest organisms that are contaminated by mercury, when the depuration rate is exceeded by the rate of uptake. Large predators such as adult largemouth bass tend to have the highest levels of mercury contamination in rivers and lakes. Mercury can pose a threat to humans primarily through the consumption of large predator fish from

Who's at Risk

A 1980 survey by the National Institute for Occupational Safety and Health (NIOSH) estimated that 70,000 workers, of whom about one-third were women, were potentially exposed to mercury (primarily mercury vapor) in the workplace. Most of these workers were employed as laboratory technicians, registered nurses, and machine operators. Household members of occupationally exposed workers may also be at increased exposure risk because mercury can be brought into the home on contaminated clothes.

Personnel potentially exposed to mercury include, but are not limited to, the following:

chlorine and caustic soda production workers

cosmetic producers

dental personnel

electroplators

explosives manufacturers

felt makers and leather tanners

grinding machine operators

hazardous waste site personnel

ink manufacturers

laboratory personnel

manufacturers of batteries, fluorescent lamps, mercury vapor lamps, switches, rectifiers

metallurgists

miners and processors of cinnabar (HgS), gold, silver, copper, zinc

paint and pigment manufacturers

painters

paper millers

pesticide/fungicide production and application workers

pharmaceutical producers

plumbers

- **Workers using mercury or mercury-containing products, as well as their household members, may be at increased risk of exposure to mercury vapor.**
- **Fetuses, infants, and children are at greatest risk of MeHg's adverse effects.**
- **Children are at increased risk of exposure to elemental mercury vapor in the home because mercury vapor tends to settle to the floor.**

Fetuses, infants, and children are at increased risk of adverse effects of MeHg. MeHg readily crosses the placenta during the prenatal stage, when the nervous system is most sensitive to mercury poisoning. Because MeHg concentrates in breast milk, nursing infants can be affected.

Children are attracted to the appearance and unique properties of liquid elemental mercury and are at risk of ingesting elemental mercury, as well as mercury-containing dust and soil, because of natural mouthing behaviors. Infants and children are at increased risk of inhaling elemental mercury because mercury vapor is heavier than air and tends to settle to the floor.

PATRICIA L. NORTON
SECRETARY

OFFICE OF SOLID AND HAZARDOUS WASTE

JOHN KOURY
ASSISTANT SECRETARY

August 26, 1986

Mrs. Johnny L. McLeod
Rt. 1, Box 434 AM
Denham Springs, La. 70726

Dear Mrs. McLeod:

This Division appreciates your inquiry into our activities at the Combustion, Inc. site.

On August 19 and 20, attempts were made to catch aquatic life from the canal adjacent to the site with the end result being one-half pound of minnows from that location and several bream from Beaver Creek at LA Hwy. 1027. We anticipate the analytical results in several weeks.

On August 21, water well samples were taken from four private wells and two public systems. We anticipate these results within two weeks at which time we will evaluate them and release to the public.

A copy of the Health Department's analysis of the Burgess Rd, Ward 2 water system is enclosed. This sample was pulled after residents voiced their concern at the public meeting held on August 5, 1986. No contaminants were detected. If you have any questions about this analysis, please contact Mr. Hughes at 342-1626.

If you have further questions about our activities concerning this site, please contact this office at 342-8925.

Sincerely,

William B. De Ville
Administrator
I.A.S. Division

WBD/NTC/de

cc: Congressman Henson Moore

Page 9.5

ANALYTICAL RESULTS: FISH TISSUE SAMPLING
SEPTEMBER, 1986

0003335
QLS JDD

Page
9.1

PESTICIDE/PCB UPGRADE ANALYSIS
Terminals

Sample Number: 072-860820-01A 8g Gambusia

Sample Location: COMBUSTION INC.
BURGESS ROAD, WALKER, LA
Sampling Date: 8/20/86
Sampling Time: 1030-1100
Sample Type: FISH
Instrument: FINNIGAN 1020 GC/MS/DS
Comments: BEAVER BRANCH

Extracted By: FT
Date Extracted: 9/3/86
Analyzed By: YHL/JW
Date Analyzed: 9/5/86
Quantified By: YHL/JW
Date Quantified: 9/9/86
Lab Supervisor: John Wong

PRIORITY POLLUTANTS	CONCENTRATION (ppb)
alpha-BHC	ND
beta-BHC	ND
delta-BHC	ND
gamma-BHC	ND
Heptachlor	ND
Aldrin	ND
Heptachlor Epoxide	3
Endosulfan I	ND
4,4'-DDE	4
Dieldrin	ND
Endrin	ND
Endosulfan II	ND
4,4'-DDD	ND
Endrin Aldehyde	ND
4,4'-DDT	ND
Endosulfan Sulfate	ND
PCB 1016	ND
PCB 1254	20
PCB 1260	37

DEO-F-04075

Sample Number: 874-860820-02A Bluegill comp 314 gs

Sample Location: COMBUSTION INC.
BURGESS ROAD, WALKER, LA
Sampling Date: 8/20/86
Sampling Time: 1030-1700
Sample Type: FISH
Instrument: FINNIGAN 1020 GC/MS/DS
Comments: WEST COYELL CREEK AT HWY 1027.

Extracted By: FT
Date Extracted: 9/3/86
Analyzed By: YHL/JW
Date Analyzed: 9/5/86
Quantified By: YHL/JW
Date Quantified: 9/9/86
Lab Supervisor: John Wong

PRIORITY POLLUTANTS	CONCENTRATION (ppb)
alpha-BHC	ND
beta-BHC	ND
delta-BHC	ND
gamma-BHC	ND
Heptachlor	ND
Aldrin	ND
Heptachlor Epoxide	1
Endosulfan I	ND
4,4'-DDE	9
Dieldrin	ND
Endrin	ND
Endosulfan II	ND
4,4'-DDD	ND
Endrin Aldehyde	ND
4,4'-DDT	ND
Endosulfan Sulfate	ND
PCB 1016	ND
PCB 1254	ND
PCB 1260	78

DEQ-E-04376

page 9.3

PESTICIDE/PCB ANALYSIS

Sample Number 022-860820-03A cal 107gram

Sample Location: COMBUSTION INC.
BURGESS ROAD, WALKER, LA
Sampling Date: 8/20/86
Sampling Time: 1330-1700
Sample Type: FISH
Instrument: FINNIGAN 1020 GC/MS/DS
Comments: WEST COYELL CREEK AT HWY 1027.

Extracted By: FT
Date Extracted: 9/3/86
Analyzed By: YHL/JW
Date Analyzed: 9/5/86
Quantified By: YHL/JW
Date Quantified: 9/9/86
Lab Supervisor: John Wong

PRIORITY POLLUTANTS	CONCENTRATION (ppb)
alpha-BHC	ND
beta-BHC	ND
delta-BHC	ND
gamma-BHC	ND
Heptachlor	ND
Aldrin	ND
Heptachlor Epoxide	<1
Endosulfan I	ND
4,4'-DDE	6
Dieldrin	ND
Endrin	ND
Endosulfan II	ND
4,4'-DDD	ND
Endrin Aldehyde	ND
4,4'-DDT	ND
Endosulfan Sulfate	ND
PCB 1016	ND
PCB 1254	12
PCB 1260	39

DEQ-E-04777

page 9.4

TABLE I ANALYTICAL DATA FOR SAMPLES FROM COMBUSTION, INC. NOV. 1980

PARAMETER(ppm)	12567-BR Pit Sludge	12607-BR Tank Effluent Pond #1
Antimony	40.00	
Arsenic	12.88	
Beryllium	0.123	
Cadmium	7.233	
Chromium	122.21	
Copper	280.275	
Lead	1019.25	
Mercury	2.415	
Nickel	38.365	
Selenium	23.33	
Silver	7.626	
Thallium	0.01	
Zinc	3621.685	
Benzene	1175.8	0.29
Chlorobenzene	244.0	
Ethylbenzene	525.0	
1,1-Dichloroethane	78.6	
1,1,1-Trichloroethane	83.8	0.10
1,1,2-Trichloroethane	61.5	0.12
Tetrachloroethylene	216.0	0.03
Trichloroethylene		0.09
Toluene	1026.1	1.01
Methylene chloride		5.79
Chloroform		0.02
Chloroethane		0.02
1,1-Dichloroethylene		0.02

RESULTS

Analysis of the sludge sample yielded very high concentrations of some of the priority pollutant metals (Table I). Zinc (3621.7 ppm) and lead (1019.3 ppm) were the two found in the highest concentrations. Thallium was the only metal not detected from the sludge sample. Copper (280.3 ppm) and chromium (122.2 ppm) were detected at concentrations over 100 ppm. Silver (7.6 ppm) and mercury (2.4 ppm) were detected at notable concentrations. Some organics detected from the sludge sample were also detected at high concentrations (Table I).

Benzene (1,175.8 ppm) and toluene (1,026.1 ppm) were detected over 1000 ppm. Chlorobenzene, ethylbenzene, and tetrachlorobenzene were detected in concentrations of 244.0, 525.0, and 216.0 ppm, respectively. Of the eight organics detected 1,1,2-Trichloroethane had the lowest concentration (61.5 ppm).

A liquid sample from the tank effluent of pond #1 yielded 10 organics when analyzed (Table I). Methylene chloride (5.79 ppm) was detected at highest concentration. Toluene (1.01 ppm) was the only other organic detected above 1 ppm.